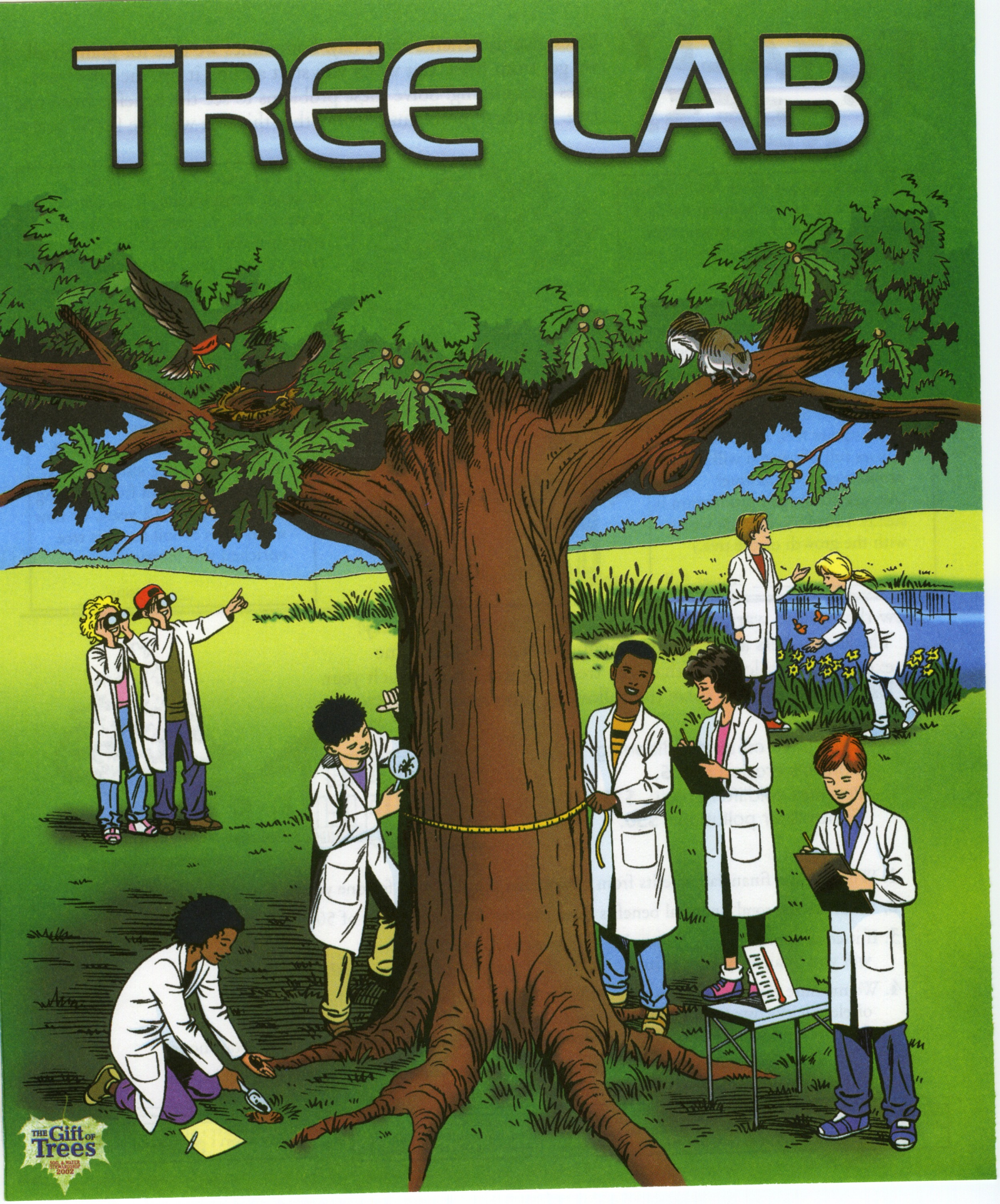

TREE LAB
THE Gift OF Trees
SOIL & WATER CONSERVATION 2002

TOTALLY TREES!

Trees give us benefits every day. Sometimes we take for granted all we get from trees. But when you start adding it up, the gifts from trees are amazing! Solve these problems to see the benefits from one tree. For these problems, assume that this tree will live for 50 years.

1. This oak tree produces 5,475 acorns in one year. If one squirrel needs 5 acorns a day, how many squirrels can be fed by this tree for one year?

_____ squirrels

2. Trees transform carbon dioxide in the air into oxygen that we need to breathe. If this one tree puts enough oxygen into the air each day to fill 2 houses that measure 1800 square feet, how many houses full of oxygen will it produce over its lifetime? (Assume its oxygen production is steady. In reality, the rate varies with the growth of the tree.)

_____ houses full

3. Trees add water vapor to the air through transpiration. If an acre of mature trees can transpire 600 tons of water per day, and there are 40 mature trees per acre, how many tons of water will one tree transpire during the warm months of May, June, July and August?

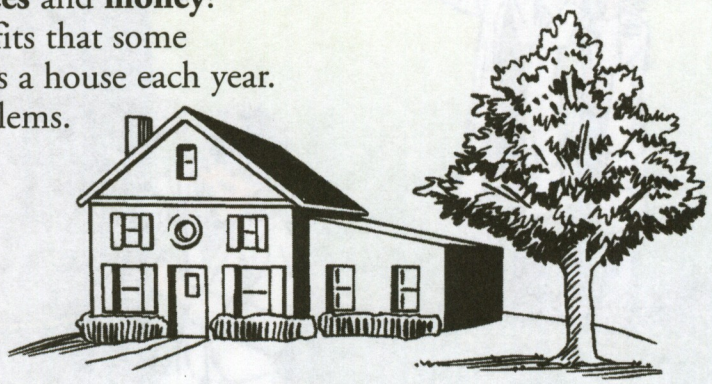
_____ tons

4. This tree adds 400 pounds of leaves to the soil each year. By holding soil with its roots, and by slowing the fall of rain with its leaves, the tree also prevents 100 pounds of soil from eroding each year. After 12 years, by how many tons of soil has this tree enriched this location?

____ tons

Now that you're warmed up, let's talk about **trees** and **money**! These numbers are the actual financial benefits that some experts have calculated that one tree provides a house each year. Using these figures, solve the following problems.

Helps save on air conditioning: **$73.**
Controls erosion : **$75.**
Provides wildlife habitat: **$75.**
Controls air pollution: **$50.**



1. What are the financial benefits from having one tree in a yard for one year? $ _____

2. What are the total financial benefits from the tree over its life span of 50 years? $ _____

3. If it costs approximately $30 to buy and plant one tree, how much will you financially benefit in the first year if you plant five new trees? $ _____

4. We measure electricity use in units of kilowatt hours. If one kilowatt hour of electricity costs 8 cents, how many kilowatt hours of electricity does one tree save you per day by reducing air conditioning costs? _____ kilowatt hours

5. If every home in a neighborhood of 50 homes plants two trees, what will be the total financial benefits to the neighborhood after ten years? Remember the initial $30 cost to buy and plant each tree. $ _____

Goal: Readers calculate environmental and financial benefits from the presence of trees in an environment.
EE Standards: Strand 2.4 – Environment and Society. Guideline A – Human/environment interactions—Learners understand that people depend on, change, and are affected by the environment. Reference to National Education Standards: Geography 132-135; Science 140.

ANSWERS
TOP: 1. Three Squirrels 2. 35,600 houses full 3. 1,845 tons 4. Three tons
BOTTOM: 1. $273. 2. $13,650. 3. $1,215. 4. 2.5 kilowatt hours 5. $270,000.

LEAFY LANGUAGE


OAK


PINE


MAPLE


REDWOOD


GRAPEFRUIT

PART ONE – Different kinds of trees have very different qualities. Read the descriptions of the trees below, and write the name of each tree in the spaces to create your **Code Key**.

CODE KEY

1. Acorns from this shade tree provide food for wildlife. | 1 | 2 | 3 |
2. This tree has thin leaves called needles and produces seed-bearing cones. | 4 | 5 | 6 | 7 |
3. A tree with colorful fall foliage that is a source of delicious syrup. | 8 | 9 | 10 | 11 | 12 |
4. Small red fruit from this tree is great in pies! | 13 | 14 | 15 | 16 | 17 | 18 |
5. Two varieties of this nut-producing tree are Black and English. | 19 | 20 | 21 | 22 | 23 | 24 |
6. Found in the Western United States, named for the color of its wood, this type of tree is one of the tallest and oldest on earth. | 25 | 26 | 27 | 28 | 29 | 30 | 31 |
7. A tropical tree whose sap is processed to make tires. | 32 | 33 | 34 | 35 | 36 | 37 |
8. Large yellow citrus fruits from this tree make a tart but delicious juice. | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 |
9. This type of tree provides wood for many baseball bats. | 48 | 49 | 50 |

PART TWO – Grow your tree vocabulary! Use the Code Key you made to complete these sentences. Find the number for each blank space above. Write the letter for that number in the blank space to complete the words.

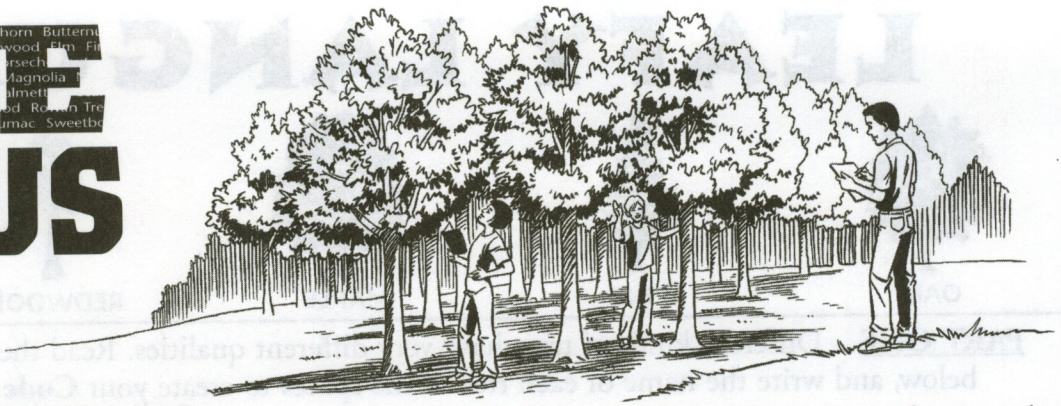
1. By providing food and shelter, trees form an important part of many wild animals' | 14 | 40 | 35 | 5 | 24 | 20 | 47 | .
2. Trees like pine, spruce and fir that keep their leaves year-round are called evergreen. Trees like oak, maple, sycamore, and walnut that lose their leaves in fall are called | 27 | 7 | 13 | 5 | 31 | 33 | 29 | 23 | 49 | .
3. Tree leaves use energy from sunlight to produce food from water and air through an amazing process called | 4 | 14 | 29 | 24 | 30 | 49 | 18 | 22 | 24 | 14 | 7 | 49 | 46 | 49 | .
4. By holding soil in place with their roots and reducing the impact of rainfall with their leaves, trees help prevent | 36 | 16 | 30 | 49 | 46 | 1 | 6 | .
5. Trees produce oxygen, reduce wind and filter out dust and other particles to help reduce air | 4 | 1 | 21 | 11 | 45 | 24 | 5 | 29 | 22 | .
6. Trees add water vapor to the atmosphere through a process called | 47 | 16 | 2 | 22 | 49 | 41 | 5 | 16 | 2 | 24 | 46 | 1 | 22 | .
7. Leaves from trees improve the soil when they are used as | 8 | 33 | 21 | 13 | 14 | .
8. Trees can be replaced by replanting, so they are considered resources that are | 39 | 7 | 22 | 15 | 28 | 2 | 35 | 21 | 7 | .

Goal: Readers identify trees from written descriptions to create a "Code Key," which they use to complete vocabulary words in sentences that describe tree resources.

EE Standards: Strand 2.4 – Environment and Society. Guideline C – Learners understand the basic concepts of resource and resource distribution. References to National Education Standards: Economics 1-2; Geography 136-137; History 22; Science 140.

ANSWERS
Part 1: 1. OAK 2. PINE 3. MAPLE 4. CHERRY 5. WALNUT 6. REDWOOD 7. RUBBER 8. GRAPEFRUIT 9. ASH
Part 2: 1. HABITAT 2. DECIDUOUS 3. PHOTOSYNTHESIS 4. EROSION 5. POLLUTION 6. TRANSPIRATION 7. MULCH 8. RENEWABLE

TREE CENSUS



Forests are **communities** of trees. Every forest is different. To study particular forests, we first need to understand the kinds and numbers of trees there.

Choose an area with trees near you. It can be a wild forest, a city park, your yard or a wooded part of a neighborhood. Conduct a tree "census" there. Use the Sample Form below as a guide to create your own census record. Bring a guidebook to help you identify trees.

Instructions

1. Identify the area where you will conduct your census. If it is not your land or public land, get permission from the landowner.
2. Measure the area with a tape measure or a piece of string cut to a known length (for example, 10 feet). Or you can estimate the length of your stride, pace the boundary of the area, and multiply the length of your stride by the number of paces.
3. Many areas will have one or two types of trees that are the largest or most common. Identify these first. Count how many of these grow there. You may wish to mark trees with a small white chalk mark as you count them to keep from counting them twice.
4. Identify and count other types of trees in the area.
5. Note the different ages of the trees in your area. For example, are most of the trees fully grown, or is there a mix of young and old trees?
6. If there is a fallen or cut tree in the area, try to count the rings to estimate the age of similar trees still standing.
7. Note the soil conditions in the area. Describe the texture and color of the soil.
8. Describe the slope of the ground. In what direction does the land slope? Does it slope toward a body of water?
9. Note any water sources visible on the surface of the land or nearby.
10. Record any wildlife you observe there. Your activity may disturb wildlife. So you may want to observe this before you begin measurements, or remain still for a while when you are finished measuring.

Sample Form

Name of Area: Hopewell Town Park

Measurements of Area: 100 feet by 100 feet

Type and Number of Trees:

White Oak (largest in area) – 7 mature trees, numerous seedlings and saplings
Silver Maple – 5 mature trees, numerous seedlings and saplings
Dogwood (most numerous) – 12 in area, numerous seedlings and saplings
Hawthorn – 6 short trees.

Soil Conditions: Thick leaf mulch on ground. Black soil. Many earthworms.

Slope: Generally level. Northern corner slopes slightly down to creek bed.

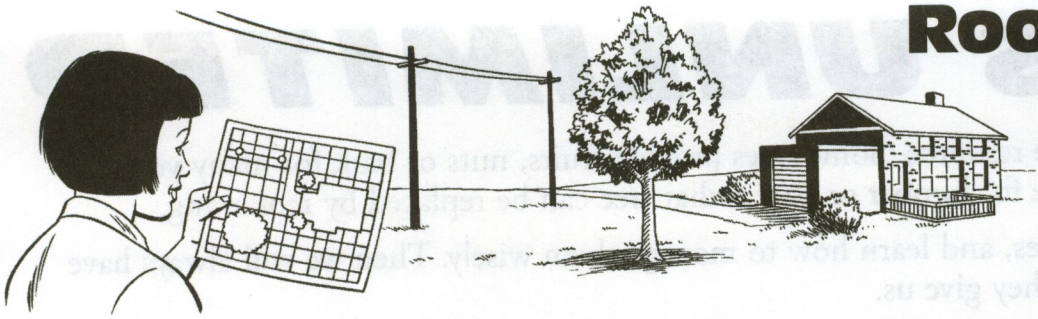
Water: Small creek visible on adjacent land.

Wildlife Seen: Woodpecker, cicada, three kinds of butterflies, chipmunk, two gray squirrels.

Other Notes: One fallen maple tree showed 47 rings on trunk. Other mature maple trees appeared about the same age.

Review the results of your census. You may want to survey different areas with different types of land and different tree populations, or compare your results with friends who have surveyed different areas. Compare and contrast the different areas. Pay particular attention to the relationships between the kinds of trees, the type of soil where they grow and the wildlife there.

Goal: Readers identify and count the trees on an area of land, note the environmental conditions and wildlife there, and compare results from different wooded areas.
EE Standards: Strand 1 – Questioning and Analysis Skills. Guideline C – Learners are able to locate and collect information about the environment and environmental topics. References to National Education Standards: Arts 31; English Language Arts 27-29, 38-39; Geography 46, 106-107; History 22; Mathematics 51-53; Science 122; Social Studies 35.



Room To GROW

Little trees become big trees. But when big trees are in the wrong place, they can bring big headaches. Before you plant a tree, do a little planning, so the tree will have room to grow. Different trees will grow to different sizes, so find out how big your small tree will grow.

1) **Look Up!** Do not plant a tree under power lines, telephone lines or cable wires.
2) **Look Down!** Avoid planting trees over drainage pipes, sewer lines, septic systems, buried cables or gas pipes. Call the utility company before you dig.
3) **Look All Around!** Plant trees far enough away from buildings to avoid damage to foundations and roofs. Plant trees so they won't interfere with sidewalk or automobile traffic as they grow.

Use this grid and a pencil to map an area near your home or school where you would like to plant a tree. Use the example above for guidance. Draw all buildings and other structures, paths and walkways, and any trees already there. Draw telephone poles and wires. Use a tape measure and draw the map to scale. (1 square on the map = 16 square feet, or 4 feet on a side)

Remember how big your tree will grow. Depending on the type of tree, it can require from 25 to 50 feet of space. Mark the best spots for a new tree. Draw the tree, at its **full grown size,** with a dotted line or a different color pencil.

MAP SCALE: Each square = 16 square feet. Each 1/4" side of a square on the map = 4 feet on the ground

Goal: Readers map an area and consider growth requirements of a tree to identify potential locations for planting the tree.
EE Standards: Strand 1 – Questioning and Analysis Skills. Guideline E – Learners are able to describe data and organize information to search for relationships and patterns concerning the environment and environmental topics. References to National Education Standards: English Language Arts 35-36; Geography 27, 107-111; Mathematics 54-56, 60-62.

TREES UNLIMITED

Trees are a truly **renewable** resource. Some trees provide fruits, nuts or bark for many years. When we use an entire tree for lumber or paper, that tree can be replaced by replanting.

We need to learn about trees, and learn how to manage them wisely. Then we will always have trees and the good things they give us.

1. Imagine you have 100 acres of trees to manage. The trees are grown for paper pulp. When you cut down or harvest trees, you must plant new seedlings so they will grow into new trees. The seedlings take ten years to grow before they can be harvested for paper pulp.

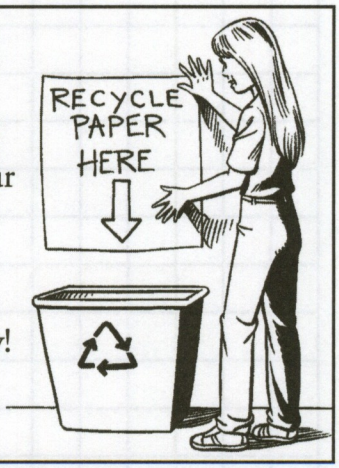
Good management means harvesting selectively, to make sure a supply of grown trees will be available in the future. Write a brief ten-year management plan for your 100 acres. There is no "right" answer – you can choose one of many different strategies. For example, you can cut down all 100 acres now, and replant all 100 acres. You will get money for the trees you cut now, but no more for 10 years, until the seedlings mature. What do you think is the best strategy?

2.

We get many products from trees that don't require the tree to be cut. For example, fruit and nut trees provide a bounty of food. Once they are established, they keep producing for many years.

Name your five favorite foods that come from trees. Choose one. Learn about the life cycle of the tree which produces it. Find out where that kind of tree grows. If it grows nearby, try to visit a farm or orchard to see the source of the food you enjoy!

3. Paper and cardboard from trees can be recycled and made into new products. Recycling helps us get the most from tree resources.



Review your paper recycling at home and at school. Do you have bins or bags that are easy to use? Do you recycle all the material allowed by your community? If your community does not recycle a particular type of paper or cardboard, inquire whether that might be possible.

Identify five products in your home or at school that were made from recycled paper. In the future, these products may be made from the paper you recycle today!

Recycling is one of the easiest and most effective ways to conserve tree resources. And the more people recycle, the more effective it gets!

1. Goal: Using growth/yield figures, readers calculate how many trees can be harvested from 100 acres of trees.
EE Standards: Strand 1 – Questioning and Analysis Skills. Guideline E – Learners are able to describe data and organize information to search for relationships and patterns concerning the environment and environmental topics. References to National Education Standards: English Language Arts 35-36; Geography 27, 107-111; Mathematics 54-56, 60-62.
2. Goal: Readers research the life cycle of a tree that provides a favorite product.
EE Standards: Strand 2.2 – The Living Environment. Guideline D – Learners know that living things need some source of energy to live and grow. References to National Education Standards: Science 129; Science Benchmarks 119.
3. Goal: Readers review local recycling strategies and identify recycled paper products they use.
EE Standards: Strand 2.4 – Environment and Society. Guideline C – Learners understand the basic concepts of resource and resource distribution. References to National Education Standards: Economics 1-2; Geography 136-137; History 22; Science 140.

Watch Trees Work

Trees greatly influence environmental conditions. Some of their actions on soil, water and air resources can be observed and measured. Choose a large tree in your yard, a park or your schoolyard. Observe and record these conditions around your tree.

1. TEMPERATURE

Use an outdoor thermometer to measure the temperature in the shade beneath the tree's canopy. Then measure the temperature in the sun away from the shade. You can either use one thermometer and measure each spot separately, or use two thermometers and measure both at once. Leave the thermometer in place for at least 5 minutes.

Temperature under tree: _____

Temperature away from tree: _____

2. AIR MOVEMENT

Observe and describe air movement near the tree's canopy and away from it. A visual aid such as a flag or a "pom-pom" will help you see how air moves. Observe air movement at different spots around the canopy, and if possible, within the canopy.

Air movement around canopy: _____

_____

Air movement away from canopy: _____

_____

Air movement within canopy: _____

_____

3. SOIL

Examine and describe soil beneath the tree and away from the tree. Actually feel the soil at each place. "Ribbon" the soil between your thumb and index finger. Compare the moisture content in the soil in both places. Compare the color of the soil samples and how well it holds together when ribboned.

Soil beneath tree: _____

_____

Soil away from tree: _____

_____

4. ANALYSIS

After reviewing your results, write a short paragraph describing your conclusions about the effect of the tree on its environment.

After you have recorded your measurements, step back and look with fresh eyes at the structure of the tree. Consider how it causes the conditions you have noted. Visualize how different parts of the tree act on the air, water and soil resources around them. For example, think how leaves clean air of dust and dirt and how they prevent rain from falling too hard. Think how roots hold soil in place.

Imagine the other long-term changes the tree may cause that you may not be able to measure at one time. For example, think of how the water quality in nearby streams is affected by the tree's actions on rain and soil.

Different trees have different identifying features. Think how the differents shaped leaves, branches, trunks and roots of different trees might affect the way in which they alter their environment. You may want to measure conditions around different types of trees and compare the results.

Trees do a lot of work to make our world more liveable!

Goal: Readers observe, measure and record environmental conditions around a tree.
EE Standards: Strand 1 – Questioning and Analysis Skills. Guideline C – Learners are able to locate and collect information about the environment and environmental topics. References to National Education Standards: Arts 31; English Language Arts 27-29, 38-39; Geography 46, 106-107; History 22; Mathematics 51-53; Science 122; Social Studies 35.

Documen-Tree

When you plant a tree, you help make the world a better place! Your tree will improve the environment for years.

Plan to plant a tree with family or friends. Use the Tree Planting Instructions as a guide. Keep track of the process by making your own documentary. You can take pictures, make sketches, write notes or video the process.

First, note conditions of the site you've chosen before you plant the tree. Then, record the process of planting the tree. It can be be hard work, but you'll enjoy remembering the fun! In the months and years that follow, observe and record how the tree you planted has changed the area around it. You'll feel great reviewing how your efforts have improved the environment!

Planting a tree can make great memories!

Tree Planting Instructions

1. Choose a good spot for your tree, away from obstacles that would crowd it as it grows. Make sure you have permission to plant there.
2. Choose the right tree for your area.
3. Dig a hole a little deeper and about twice as wide as the roots of your tree.
4. Place the tree in the hole at the same depth it grew in the nursery.
5. Fill the hole with soil.
6. Place two to four inches of mulch around the tree, but not touching the tree trunk.
7. Water the tree well.
8. Water and protect the tree as it grows.

RELATED ACTIVITIES

- Use your "Leaf Code" from Page 2 (Leafy Language) to write a note to your friend.
- Ask a utility spokesperson to talk to your class about the dangers of trees that grow too close to homes or powerlines, and about problems that can occur if people do not get permission from the utility company before they dig.
- Find a spot in a nearby city that could benefit from having a tree planted. Make a list of all the ways the tree will make the site better. Ask a local business to sponsor a tree. Create a wooden plaque or sign that identifies your group or the sponsor for your tree. Put the sign near the tree after it is planted.
- Visit a nursery or ask a nursery worker to speak to class about what trees grow best in your area. Learn about the range of sizes, foliage and shapes available.
- Leaves provide valuable food for trees and other plants. Build a leaf compost pile on your school yard or at home. Collect leaves and add green plants or other source of nitrogen to the pile. Keep the pile moist and turn it every few weeks. Use the composted leaves and as mulch for trees and other plants.
- Find the most unusual product you can find in your house that comes from trees. Ask your friends or classmates to do the same and compare your results.

NOTE TO EDUCATORS: Each activity was developed with an educational goal in mind that should be adapted to the needs of the grade level you are teaching. Also, each activity is correlated to environmental education standards established by the North American Association of Environmental Education, as outlined in the book **Excellence in EE** – Guidelines for Learning (K-12). Note that each guideline includes references to national education standards that form the basis for the state standards you follow. The goal and standards are listed at the bottom of each activity.

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